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THE MINERAL INDUSTRY OF PENNSYLVANIA IN 1986

L. J. Prosser, Jr.
Samuel W. Berkheiser, Jr.

COMMONWEALTH OF PENNSYLVANIA
Robert P. Casey, Governor
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Arthur A. Davis, Secretary
OFFICE OF RESOURCES MANAGEMENT
BUREAU OF
TOPOGRAPHIC AND GEOLOGIC SURVEY
Donald M. Hoskins, State Geologist

COVER: Main adit and plant of Bradys Bend Corporation, which operates this underground limestone mine in northwestern Armstrong County (Appalachian Plateaus physiographic province). In addition to producing quality construction aggregate and agricultural limestone, this operation rents out storage space in the mined-out rooms, each of which is approximately 30 by 30 feet. Over 2,300 unit-spaces (for cars, boats, recreational vehicles, and so forth) are contracted annually; 350 of the spaces have controlled heat and humidity. This demonstrates how worked-out areas of a deep mine can be turned into a valuable asset through creativity and careful planning.

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FY 6345/A.10.7 no. 97
Prosser, L. J.
The mineral industry of
Pennsylvania in 1982

UNITED STATES DEPARTMENT OF THE INTERIOR • Donald Paul Hodel, Secretary

BUREAU OF MINES • T S Ary, Director

This publication is a chapter from the current Bureau of Mines Minerals Yearbook, comprising *Volume I, Metals and Minerals; Volume II, Area Reports: Domestic; Volume III, Area Reports: International.* The separate volumes of the Yearbook are sold by the Superintendent of Documents, Washington, D.C. 20402.

The Mineral Industry of Pennsylvania

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources, for collecting information on all nonfuel minerals.

By L. J. Prosser, Jr.,[1] and S. W. Berkheiser, Jr.[2]

The value of nonfuel mineral production in Pennsylvania was $843 million in 1986, ranking the State ninth nationally. Value increased by about $39 million over that of 1985 despite production losses in three of the State's leading commodities. Higher prices for most commodities, along with an increase in cement production, resulted in a record-high value for the second consecutive year.

Although the State's nonfuel minerals sector continued to benefit from construction industry demand, both the coal and steel industries reported their lowest production totals of the decade.

Table 1.—Nonfuel mineral production in Pennsylvania[1]

Mineral	1984		1985		1986	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	298	$20,849	303	$20,970	391	$26,683
Portland do.	5,735	281,590	5,535	288,036	6,290	324,187
Clays[2] do.	963	4,050	1,142	5,293	1,234	5,061
Gem stones	NA	e5	NA	e5	NA	5
Lime thousand short tons	1,620	90,182	1,492	85,269	1,417	81,234
Peat do.	24	693	21	602	19	532
Sand and gravel:						
Construction do.	14,472	64,285	e17,000	e74,000	15,373	68,880
Industrial do.	W	W	693	9,846	688	10,091
Stone:						
Crushed do.	e56,200	e228,000	64,765	310,859	e63,700	e317,100
Dimension do.	r e93	r e7,026	51	8,214	e72	e8,100
Combined value of clays (kaolin), mica (scrap), tripoli (1986), and value indicated by symbol W	XX	12,701	XX	1,380	XX	1,185
Total	XX	r709,381	XX	804,474	XX	843,058

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" figure. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Excludes kaolin; value included with "Combined value" figure.

Table 2.—Nonfuel minerals produced in Pennsylvania in 1985, by county[1]

County	Minerals produced in order of value
Adams	Lime, stone (crushed), clays, mica (scrap).
Allegheny	Cement, stone (crushed), clays, sand (industrial).
Armstrong	Stone (crushed), clays.
Bedford	Stone (crushed).
Berks	Cement, stone (crushed), clays.
Blair	Stone (crushed).
Bucks	Stone (crushed), stone (dimension), clays.
Butler	Lime, stone (crushed), cement.
Carbon	Sand (industrial).
Centre	Lime, stone (crushed).
Chester	Stone (crushed), stone (dimension), clays.
Clearfield	Clays, stone (crushed).
Clinton	Stone (crushed), clays.
Columbia	Stone (crushed).
Cumberland	Do.
Dauphin	Do.
Delaware	Do.
Erie	Peat.
Fayette	Stone (crushed).
Franklin	Do.
Fulton	Do.
Huntingdon	Sand (industrial), stone (crushed).
Jefferson	Clays, stone (crushed).
Juniata	Stone (crushed).
Lackawanna	Stone (crushed), peat.
Lancaster	Stone (crushed), clays.
Lawrence	Cement, stone (crushed), clays, peat.
Lebanon	Stone (crushed), lime.
Lehigh	Cement, stone (crushed), stone (dimension).
Luzerne	Stone (crushed), peat.
Lycoming	Stone (crushed).
McKean	Do.
Mercer	Do.
Mifflin	Do.
Monroe	Stone (crushed), clays, peat.
Montgomery	Stone (crushed), lime, stone (dimension).
Montour	Stone (crushed).
Northampton	Cement, stone (crushed), stone (dimension).
Northumberland	Stone (crushed), clays.
Perry	Stone (crushed).
Pike	Do.
Schuylkill	Do.
Snyder	Do.
Somerset	Do.
Susquehanna	Stone (crushed), stone (dimension).
Tioga	Stone (crushed).
Union	Do.
Venango	Do.
Wayne	Stone (dimension).
Westmoreland	Stone (crushed).
York	Stone (crushed), cement, lime, clays.
Undistributed[2]	Sand and gravel (construction), gem stones.

[1]No production of nonfuel mineral commodities was reported for counties not listed.
[2]Data not available by county for minerals listed.

Table 3.—Indicators of Pennsylvania business activity

		1984[r]	1985	1986[p]
Employment and labor force, annual average:				
Population	thousands	11,890	11,863	11,888
Total civilian labor force	do.	5,479	5,528	5,634
Unemployment	percent	9.1	8.0	6.8
Employment (nonagricultural):				
Mining total[1]	thousands	38.6	36.3	33.6
Nonmetallic minerals except fuels	do.	4.0	4.6	4.8
Coal mining	do.	29.1	26.1	24.2
Oil and gas extraction[1]	do.	5.4	5.6	4.5
Manufacturing total	do.	1,121.9	1,089.5	1,049.1
Primary metal industries	do.	117.9	104.1	90.6
Stone, clay, and glass products	do.	49.0	47.9	47.1
Chemicals and allied products	do.	59.2	59.6	58.4
Petroleum and coal products	do.	13.0	12.7	10.7
Construction	do.	175.8	187.1	202.4
Transportation and public utilities	do.	244.2	240.6	240.0
Wholesale and retail trade	do.	1,033.1	1,067.4	1094.9
Finance, insurance, real estate	do.	253.5	263.1	277.3
Services	do.	1,114.9	1,166.1	1,217.7
Government and government enterprises	do.	672.9	680.2	679.6
Total[2]	do.	4,654.8	4,730.3	4,794.5
Personal income:				
Total	millions	$151,457	$160,627	$169,392
Per capita		$12,738	$13,540	$14,249
Hours and earnings:				
Total average weekly hours, production workers		40.2	39.9	40.2
Mining (nonmetallic minerals, except fuels)		44.6	45.0	45.9
Total average hourly earnings, production workers		$9.3	$9.6	$9.7
Mining (nonmetallic minerals, except fuels)		$9.3	$9.7	$9.9
Earnings by industry:[3]				
Farm income	millions	$982	$937	$1,055
Nonfarm	do.	$104,604	$110,809	$117,132
Mining total	do.	$1,701	$1,776	$1,686
Nonmetallic minerals except fuels	do.	$102	$123	$110
Manufacturing total	do.	$29,072	$29,517	$29,456
Primary metal industries	do.	$4,124	$3,756	$3,334
Stone, clay, and glass products	do.	$1,341	$1,385	$1,421
Chemicals and allied products	do.	$1,990	$2,150	$2,245
Petroleum and coal products	do.	$685	$692	$601
Construction	do.	$6,023	$6,495	$7,336
Transportation and public utilities	do.	$7,707	$7,878	$8,199
Wholesale and retail trade	do.	$16,311	$17,351	$18,611
Finance, insurance, real estate	do.	$5,666	$6,247	$7,405
Services	do.	$23,808	$26,425	$28,813
Government and government enterprises	do.	$13,952	$14,768	$15,207
Construction activity:				
Number of private and public residential units authorized[4]		39,546	43,566	53,442
Value of nonresidential construction[4]	millions	$2,013.0	$2,115.4	$2,145.5
Value of State road contract awards[5]	do.	$941.0	$1,252.0	$912.0
Shipments of portland and masonry cement to and within the State	thousand short tons	2,686	3,025	3,367
Nonfuel mineral production value:				
Total crude mineral value	millions	$709.4	$804.5	$843.1
Value per capita		$60	$68	$71

[p]Preliminary. [r]Revised.

[1]Bureau of Economic Analysis, Regional Economic Measurement Division, U.S. Department of Commerce.

[2]Data may not add to totals shown because of independent rounding.

[3]Includes wages and salaries, proprietors' income, and other labor income; cannot be directly related to employment because of inclusion of proprietors' income.

[4]Construction Review, International Trade Administration, U.S. Department of Commerce, May-June 1987, pp. 26-27, 35-36.

[5]Highway and Heavy Construction Magazine, Jan. 1986, p. 32.

Sources: U.S. Department of Commerce, U.S. Department of Labor, Highway and Heavy Construction Magazine, and U.S. Bureau of Mines.

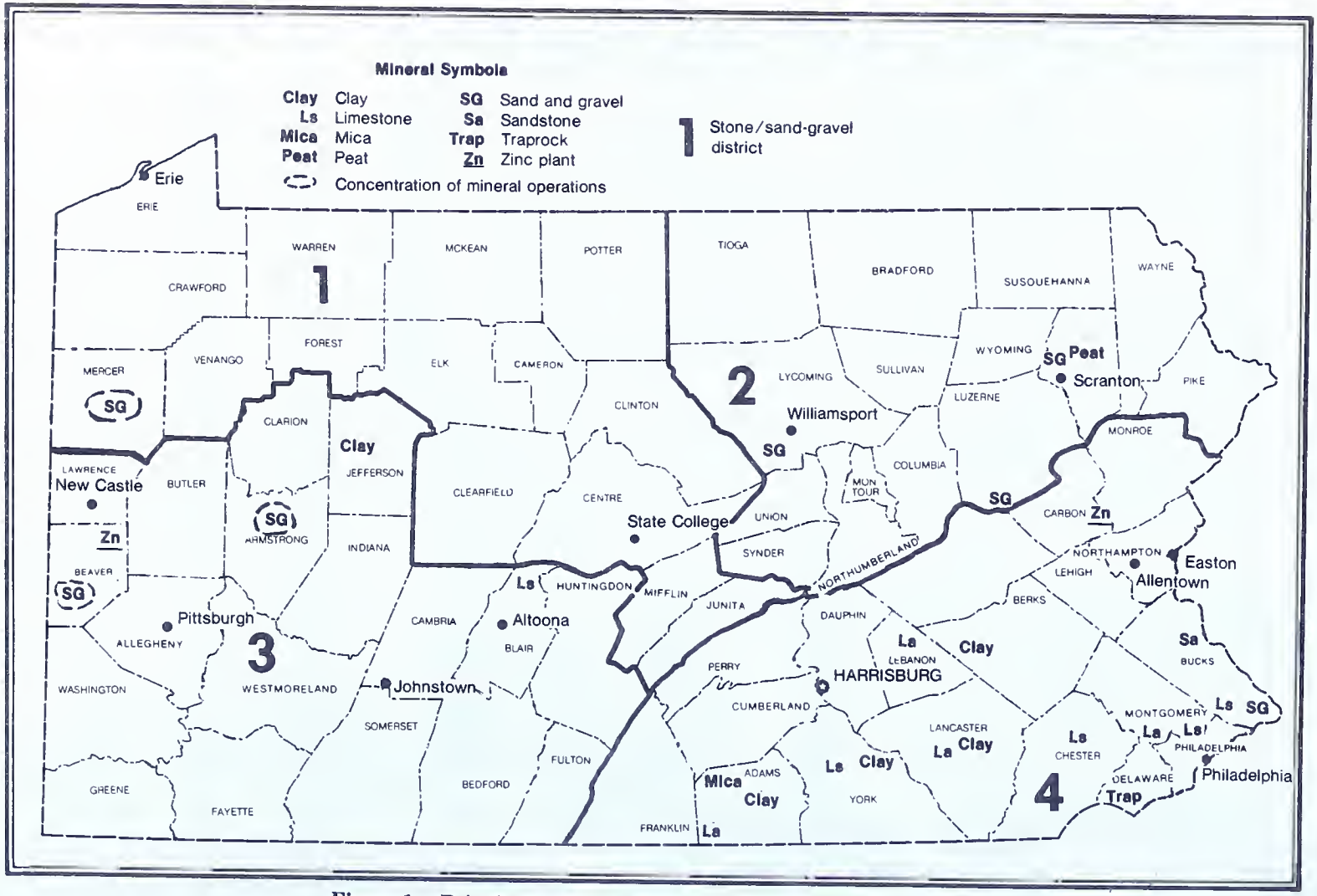

Figure 1.—Principal mineral-producing localities in Pennsylvania.

Trends and Developments.—Nonfuel mineral production in Pennsylvania for the past 2 years was revitalized by strong demand from the construction industry. The output of most nonfuel minerals peaked in the late 1970's and began to decline during 1980. By 1982, the value of mineral production had dropped by $121 million from that of 1979. Production and value began to rebound in 1983 and continued increasing through 1986. The value of nonfuel mining increased $242 million from 1982 to 1986.

Despite the significant gain in value, output remained below the levels reported in the late 1970's, although increasing since 1982. Higher average production was reported in 1978-79 for crushed stone (6.2 million short tons), sand and gravel (3.3 million tons), and cement (720,000 tons) than in 1985-86.

The State's coal and steel industries reported much greater declines in production than those reported in the late 1970's. Bituminous coal production of 69.5 million short tons in 1986 was about 20 million tons lower than that of 1979. In steel, output dropped 66% from that of 1979. A 5-month strike at the State's leading steelmaker in 1986 affected production, but not as much as the increased international competition, which, since 1980, resulted in plant closings and capacity cutbacks.

The decline in coal and steel directly affected Pennsylvania's lime and limestone industries. Both the steel industry and the coal industry, to a lesser extent, consumed lime and limestone in their operations. Losses also occurred indirectly in production of other nonfuel minerals as employment and earnings declined in the steel and coal industries.

Legislation and Government Programs.—The U.S. Department of Transportation proposal to sell the federally owned Consolidated Railroad Corp. (Conrail) directly to private interests was dropped. That action concerned the State's coal, steel, and other mineral producers who depended on rail transportation to move bulk cargoes. Although not finalized at yearend, a public offering of Conrail stock was expected in 1987. Nearly 40% of the company work force and 28% of its railroad system are in Pennsylvania.

The U.S. Bureau of Mines Pittsburgh Research Center continued research programs directed at improving health, safety, and productivity in the mining industries and conserving environmental resources. Mine-scale research was conducted under controlled conditions at facilities including the Experimental Mine, the Safety Research Coal Mine, the Mine Equipment Test Facility, the Wire Rope Laboratory, and the Lake Lynn Laboratory. In addition, the Bureau funded the Mining and Mineral Resources and Research Institute at Pennsylvania State University (PSU) under Public Law 98-409. PSU received a $142,000 grant for that program and shared in a $5 million grant as one of five generic research centers.

The Pennsylvania Bureau of Topographic and Geologic Survey was the primary State agency involved in mineral resource investigations. Previously unknown high-purity silica resources from 30 locations in the eastern part of the State were examined.[3] Articles on selected industrial mineral activities in Pennsylvania, such as use of carbonate building stone from Cumberland County,[4] limestone production in the Allegheny Plateau,[5] underground clay mining for the manufacture of chimney bricks,[6] and an annual mining review[7] were published. Approximately 210 feet of limestone with 90% $CaCO_3$ and 4% insoluble residue was identified in the Valley and Ridge Province near Union Furnace, PA.[8] A short historical and economic geologic review of the State was published as part of the survey's 150th anniversary.[9]

The Pennsylvania survey also reported that interest remained high in exploration for industrial minerals used primarily as fillers. Investigations were conducted for resources of carbonate, mica, silica, and talc. A previously discovered talc deposit in Lancaster County received a permit from the State Department of Environmental Resources (DER). Limited production at that mine was expected to begin in 1987, with initial sales for use as roofing-grade material.

Government programs involving waste materials, including utilization and recycling research, continued during the year. In each of the past 3 years, Pennsylvania has generated more than 5 million short tons of hazardous waste. The primary metals industry produced about 40% of the waste.

Treatment and disposal of hazardous wastes typically becomes a local issue when a site for a new facility is chosen. The State DER, however, has the authority to issue a Certificate of Public Necessity enabling a proposed facility to be built despite local objections.

The U.S. Bureau of Mines and St. Joe

Minerals Corp., in Monaca, PA, signed a 3-year, $3.45 million agreement to continue development of flame-reactor technology for recovery of cobalt, lead, nickel, and zinc from dust waste generated in steel manufacturing in electric arc furnaces. Annually, about 500,000 short tons of dust is generated by the domestic steel industry. In 1986, St. Joe operated a prototype plant and expected to market the process in 1987.

The U.S. Department of Energy and East Stroudsburg University successfully demonstrated the conversion of anthracite waste material into useful energy. Anthracite has been produced in Pennsylvania for more than 150 years, and in excess of 900 million tons of waste or culm has resulted from that production. The culm, which is low-quality anthracite typically laden with rock, was estimated to have the energy equivalent of more than 1 billion barrels of oil.

REVIEW BY NONFUEL MINERAL COMMODITIES

INDUSTRIAL MINERALS

Most of the nonfuel mineral commodities identified in table 1 are discussed in this section. Commodities processed or manufactured in Pennsylvania included graphite, gypsum, perlite, slag, sulfur, sulfuric acid, and vermiculite.

Cement.—Output of portland cement exceeded 6 million short tons for the first time in 7 years. Availability of lower cost imports prevented a price increase despite strong demand from the construction industry. Typically, during periods of strong demand, cement producers are able to invest in plant improvements as profit margins usually increase. However, because of the intense international competition, cement prices in 1986 remained flat. This particularly affected Pennsylvania's cement industry because most of its plants were the wet-process type, which is more energy intensive and, therefore, more costly to operate.

Cement data for Pennsylvania are divided into two districts: eastern Pennsylvania, which is all counties east of the eastern boundaries of Potter, Clinton, Centre, Huntingdon, and Franklin Counties; and western Pennsylvania, which is all other counties in the State. The State's nine eastern plants produced 4.8 million short tons of portland cement, utilizing about 81% of capacity. Pennsylvania's four western plants produced about 1.4 million tons of portland cement, utilizing about 62% of capacity. Pennsylvania ranked third nationally in portland cement production and second in masonry cement.

Clays.—Demand for common clay, as used in the manufacture of brick, resulted in the third consecutive year of increased State output. About 72% of the clay mined in Pennsylvania was made into brick. Fire clay production used primarily by the steel industry in refractories dropped by nearly 36,000 short tons or about 45% compared with the 1985 total. Statewide, 14 companies produced common clay; 3 companies produced fire clay; and 1 company produced kaolin. Data for kaolin are proprietary.

Ibstock-Johnson Ltd., a brick manufacturing firm from the United Kingdom, purchased Hanley Brick Inc. of Summerville, Jefferson County. Hanley, in operation for 93 years, has the capacity to produce 50 million brick annually. In 1979, Ibstock-Johnson acquired the Glen-Gery Corp., the State's leading clay producer.

During the year, Glen-Gery increased brickmaking capacity at its Bigler, Berks County, operation with installation of an oxygen-injection system. The firm resumed mining after settlement of a 4-year zoning dispute at an operation near Reading. Glen-Gery agreed to restore mined land to its original condition, protect the ground water, and pay $10,000 to Lower Heidelberg Township to increase the area it was allowed to mine.

Harbison-Walker Refractories, a division of Dresser Industries Inc., permanently shut down its Mount Union plant. The decline in steelmaking and weak demand for coke-oven products were cited in closing the facility, which had produced silica brick for more than 90 years.

Table 4.—Pennsylvania: Clays sold or used by producers, by use[1]

(Short tons)

Use	1985	1986
Common brick	10,000	28,681
Face brick	772,491	857,013
Firebrick, blocks and shapes	139,204	119,392
Flue linings	44,348	32,823
Mortar and cement, refractory	38,926	30,682
Portland and other cements	93,080	119,904
Tile: Drain, quarry, structural	31,295	31,001
Other[2]	12,873	14,295
Total	1,142,217	1,233,791

[1]Excludes kaolin.
[2]Includes paint, lightweight aggregates, highway surfacing, and structural concrete.

Lime.—Pennsylvania ranked third nationally in output, accounting for about 10% of the U.S. total. The trend toward increased lime usage for environmental applications such as sulfur removal from stack gases and mine and plant acid water neutralization continued, while the consumption by the steel industry remained on the decline. Output in 1986 of 1.4 million short tons was slightly lower than that of 1985, but far below the average production in the late 1970's of 2.1 million tons.

Table 5.—Pennsylvania: Lime sold and used by producers, by use

Use	1985		1986	
	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)
Steel, basic oxygen furnace	545,453	$29,454	569,221	$28,847
Steel, electric	194,462	10,495	146,770	7,007
Sewage treatment	143,342	8,807	107,790	6,131
Acid water neutralization (mine and plant)	46,428	2,464	57,691	3,135
Water purification	72,543	4,323	64,514	3,720
Paper and pulp	30,844	1,543	25,779	1,265
Agriculture	W	W	11,639	767
Other[1]	458,907	28,183	433,897	30,362
Total	1,491,979	85,269	1,417,301	81,234

W Withheld to avoid disclosing company proprietary data; included with "Other."
[1]Includes alkalies, animal and human food, glass, manganese (1985), mason's lime, oil well drilling (1985), paint, petroleum refining, refractories, sand lime brick, soil stabilization, sugar refining, sulfur removal from stack gases, steel (open-hearth), tanning, wire drawing, other chemical and industrial uses, other metallurgy, other ore concentration, and data indicated by symbol W.

Mica.—One company mined a small quantity of mica (sericite) from an open pit near Fairfield, Adams County. The material was processed at a plant in Aspers and marketed to the automotive industry as a filler and extender.

Peat.—In 1986, eight companies produced peat; two each in Erie and Lackawanna Counties, three in Luzerne County, and one in Monroe County.

Sand and Gravel.—*Construction.*—Construction sand and gravel production is surveyed by the U.S. Bureau of Mines for even-numbered years only; this chapter contains actual data for 1984 and 1986 and estimates for 1985. Data for odd-numbered years are based on annual company estimates.

The average price per short ton of sand and gravel in Pennsylvania of $4.48 (plant f.o.b.) was the second highest in the Nation. The average U.S. price per ton in 1986 was $3.11. A similar pattern of higher prices for sand and gravel occurred in States bordering Pennsylvania that produced less than 20 million short tons. In Maryland, with output totaling about 18 million tons, the average price of $4.78 per ton was highest in the Nation. In New Jersey, with production of 14 million tons, the average price was $3.84. However, in Ohio, which produced about 37 million tons, the average price was $3.44 per ton, and in New York, with output of 31 million tons, the price was $3.33.

In 1986, the U.S. Bureau of Mines began compiling sand and gravel production statistics by districts for some States. Table 7 presents end-use data for sand and gravel in the four Pennsylvania districts that are outlined in figure 1.

Sand and gravel was produced in 37 of Pennsylvania's 67 counties. Bucks, Westmoreland, Mercer, Northampton, and Wyoming were the leading producing counties in order of descending output. Statewide, 107 companies operated 137 pits producing about 15.4 million tons of sand and gravel. New mining permits were pending with the State DER for 14 sand and gravel operations having a combined capacity of about 500,000 short tons.

Table 6.—Pennsylvania: Construction sand and gravel sold or used in 1986, by major use category

Use	Quantity (thousand short tons)	Value (thousands)	Value per ton
Concrete aggregates (including concrete sand)	4,100	$20,679	$5.04
Plaster and gunite sands	249	1,378	5.53
Concrete products (blocks, bricks, pipe, decorative, etc.)	473	2,548	5.39
Asphaltic concrete aggregates and other bituminous mixtures	2,579	11,993	4.65
Road base and coverings[1]	3,075	13,375	4.35
Fill	405	1,303	3.22
Snow and ice control	278	1,108	3.99
Other[2]	248	1,098	4.43
Other unspecified[3]	3,967	15,399	3.88
Total[4] or average	15,373	68,880	4.48

[1]Includes road and other stabilization (cement and lime).
[2]Includes roofing granules.
[3]Includes production reported without a breakdown by end use and estimates for nonrespondents.
[4]Data may not add to totals shown because of independent rounding.

Table 7.—Pennsylvania: Construction sand and gravel sold or used by producers in 1986, by use and district

(Thousand short tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates (including concrete sand)[1]	810	2,883	898	4,096	887	5,923	2,227	11,703
Asphaltic concrete aggregates and other bituminous mixtures	448	1,777	578	2,461	1,000	6,341	553	1,414
Road base and coverings[2]	744	2,244	580	2,295	766	4,539	985	4,297
Fill	269	855	84	141	W	W	W	W
Snow and ice control	113	357	59	199	W	W	W	W
Other unspecified[3]	1,342	3,974	1,329	5,672	1,138	5,975	565	1,736
Total[4]	3,725	12,089	3,528	14,863	3,791	22,778	4,330	19,150

W Withheld to avoid disclosing company proprietary data; included with "Other unspecified."
[1]Includes plaster and gunite sands and concrete products (blocks, bricks pipe, decorative, etc.).
[2]Includes road and other stabilization (cement and lime).
[3]Includes roofing granules, production reported without a breakdown by end use, estimates for nonrespondents, and data indicated by symbol W.
[4]Data may not add to totals shown because of independent rounding.

Industrial.—Three companies produced industrial sand in Pennsylvania, one each in Allegheny, Carbon, and Huntingdon Counties. Most of the sand was used in glass manufacture.

Stone.—Stone production is surveyed by the U.S. Bureau of Mines for odd-numbered years only; this chapter contains estimates for 1984 and 1986 and actual data for 1985. Data for even-numbered years are based on annual company estimates.

Crushed.—Pennsylvania ranked third nationally in crushed stone production, accounting for about 6% of the U.S. total. Seven new crushed stone operations with a total annual capacity of about 1 million short tons were reported to have begun work during the year. Most of these operations were in western Pennsylvania and resulted from adjustments to new absorption standards adopted by the State Department of Transportation.

About 70% of the crushed stone produced in Pennsylvania was limestone. Emphasis on and development of clean coal technology (CCT) has expanded in the past few years, coinciding with increased concern and legislation aimed at lowering sulfur dioxide emissions, a component of acid rain. Generally, CCT removes sulfur from coal, with some of the technology requiring as much as 1 ton of limestone for every 3 tons of coal burned. Because of this situation, speculation existed that utilities may combine coal and lime-limestone purchases. If this occurred, coal companies could diversify into the limestone business or develop marketing arrangements with limestone producers to secure limestone sources.[10] In addition, six new cogeneration plants were in various stages of planning and development in the eastern part of the State. An estimated 250,000 to 500,000 tons of carbonate rock was expected to be used at these plants equipped with European-designed fluidized-bed systems.

Dimension.—Sandstone, slate, and diabase were quarried for dimension stone products. Two new flagstone (bluestone) quarries received permits in the eastern part of the State. These operations marketed building stone to Philadelphia markets.

METALS

Metals discussed in this section were processed from materials received from both foreign and domestic sources. Production and value data for these commodities, which are not included in table 1, are given if available.

Beryllium.—The Cabot Wrought Products Div. of Cabot Corp. sold its Reading, PA, facilities, among others, to NGK Insulators Ltd. of Japan. The operation was renamed NGK Metals Corp. and continued producing beryllium-copper and other beryllium alloys.

Iron and Steel.—Shipments of steel and pig iron dropped substantially, primarily because of a 5-month labor strike at the State's leading steelmaker. USX Corp., formerly United States Steel Corp., was unable to negotiate a new labor agreement, which would have prevented a work stoppage that began August 1 and continued through yearend. USX also finalized a $3.7 billion agreement to purchase Texas Oil & Gas Corp. that lessened its steel operations to 33% of its total business.

During labor contract negotiations, USX offered to guarantee installation of a continuous caster at its Edgar Thomson plant in Braddock and to modernize the Irvin plant in Dravosburg if a 4-year agreement was accepted.[11] None of USX's steel plants in Pennsylvania was equipped with continuous casters as of yearend; nationwide, more than one-half of the raw steel produced was continuously cast.

Also during the year, USX idled its structural steel mill in Homestead, ending all production at that operation. The indefinite shutdown removed 531,000 short tons of annual capacity from the market and reduced to two the number of large (52-inch) structural steel mills operating in the United States. The Homestead plant had employed 2,400 workers in 1984.

Steelmakers, other than USX, reached new labor contracts that lowered wages and benefits in return for profit-sharing plans. Despite a contract that reduced labor costs, LTV Corp. filed for chapter 11 protection under the Federal Bankruptcy Code. Although LTV had previously closed its Pittsburgh and Alliquippa Works in Pennsylvania, the filing adversely affected another segment of the State's mining industry. Under chapter 11 protection, LTV was able to withdraw from high-priced, long-term raw materials purchase contracts. One of those contracts for 1.5 million tons of coal per year was with a coal producer in Washington County, which subsequently closed its mine.

Also permanently closed in 1986 was Wheeling-Pittsburgh Corp.'s (W-P) blast and basic oxygen furnaces in Monessen. As a result of that closure, all of W-P's raw-steel-producing operations in Pennsylvania were shut down. W-P, in chapter 11 since 1985, determined it could not afford to upgrade the operation with electric arc furnaces, thus jeopardizing operation of its rail mill at Monessen. The rail mill, one of three in the United States, was operated sporadically during the second half of the year. The market for rails had diminished from 1.2 million tons in the early 1980's to 800,000 in 1986, with the Monessen mill producing 350,000 tons, or only about one-third the mill's capacity.

Bethlehem Steel Corp. operated three of its five raw-steel-producing facilities in Pennsylvania at Bethlehem, Johnstown, and Steelton. During the year, layoffs and production cutbacks occurred at all three operations as the firm reported a loss for the fifth consecutive year. Because of the tenuous operating conditions at W-P's rail mill in Monessen, Bethlehem expressed interest in purchasing or supplying that oper-

ation with semifinished steel.

Bethlehem also announced intentions to sell certain limestone operations, including quarries in Adams and Lebanon Counties. Production from those quarries was also used in lime manufacture. Output from those operations ranked Bethlehem as the leading lime and third leading crushed stone producer in the State.

Ferroalloys.—Production remained about the same for the third consecutive year, indicating a stabilizing of the supply-demand situation for Pennsylvania.

Conditions in the industry nationwide continued to decline as shipments by producers dropped 9% compared with those of 1985. Continued weak demand from the steel industry, a major consuming industry, and competition from imports combined to keep domestic shipments below 1 million short tons for the second year in a row.

Titanium.—A. Johnson Metals Corp. operated 1 of 11 domestic titanium metal ingot plants at Lionville. Plant capacity was 1,500 short tons of commercially pure ingot and slab. ALTA Group continued in its second year of production of high-purity titanium used in advanced materials applications such as prosthetics at its plant in Evans City.

Zinc.—St. Joe Resources operated one of four primary zinc smelters in the United States at Monaca, primarily using concentrates from the firm's zinc mines in New York. The New Jersey Zinc Co. Inc. (NJZI) produced zinc oxide at its plant in Palmerton. Horsehead Resources Development Co., operators of wash kiln facilities at NJZI's Palmerton plant, and St. Joe were using and developing technology to recover salable products from electric arc furnace dust, a waste material from steelmaking.

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[1]State Mineral Officer, Bureau of Mines, Pittsburgh, PA.

[2]Economic geologist, Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources, Harrisburg, PA.

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Table 8.—Principal producers

Commodity and company	Address	Type of activity	County
Cement:			
Coplay Cement Co	Drawer 32 Nazareth, PA 18064	Plant and quarries.	Lehigh and Northampton.
General Portland Inc	5160 Main St. Whitehall, PA 18052	Plant	Lehigh.
Hercules Cement Co	Center St. Stockertown, PA 18083	Plant and quarry.	Northampton.
Lone Star Industries Inc	Box 90765 Houston, TX 77290	Plant	Do.
Clays:			
L. D. Baumgardner Coal Co. Inc	Box 104, R.D. 3 Phillipsburg, PA 16866	Pit	Clearfield.
Glen-Gery Corp	Box 1542 Reading, PA 19603	Pits and plant	Adams, Berks, York.
Medusa Corp	Box 5668 Cleveland, OH 44101	Pit	Lawrence.
Lime:			
Bethlehem Steel Corp.[1]	Martin Tower Bethlehem, PA 18016	Plants and quarries.	Adams and Lebanon.
Mercer Lime & Stone Co	525 William Penn Pl. Pittsburgh, PA 15219	Plant	Butler.
Warner Co	Yellow Springs Rd. Devault, PA 19432	Plant, mine, quarries.	Centre and Chester.
Peat:			
Gouldsboro Wayne Peat Co	Box 68 Gouldsboro, PA 18424	Bog	Lackawanna.
Lake Benton Peat Moss	622 South Blakely St. Dunmore, PA 18512	Bog	Do.

See footnote at end of table.

Table 8.—Principal producers —Continued

Commodity and company	Address	Type of activity	County
Sand and gravel:			
Construction:			
Davison Sand & Gravel Co	Third Ave. and Fourth St. New Kensington, PA 15068	Dredge and pits.	Armstrong and Westmoreland.
Dravo Corp	4800 Grand Ave. Pittsburgh, PA 15222	Dredge, pit, plant.	Allegheny and Beaver.
Glacial Sand & Gravel Co	Box 1022 Kittanning, PA 16201	____do ___	Armstrong.
Stabler Co. Inc.[1]	Box 3188 Wescoville, PA 18106	Pits and plants.	Bradford and Northampton.
Warner Co	699 Bristol Pike Morrisville, PA 19067	Pit and plant	Bucks.
Wyoming Sand & Stone Co	R.D. 1 Falls, PA 18615	____do ___	Wyoming.
Industrial:			
McCrady Inc	Box 11566 Pittsburgh, PA 15238	Quarries and plant.	Allegheny.
U.S. Silica Co	Box 187 Berkeley Springs, WV 25411	____do ___	Huntingdon.
Stone:			
Crushed:			
The General Crushed Stone Co., a subsidiary of Koppers Co. Inc.	Box 231 Easton, PA 18042	____do ___	Berks, Bucks, Chester, Clinton, Columbia, Dauphin, Delaware, Lancaster, Montour, Tioga, York.
New Enterprise Stone & Lime Co. Inc	R.D. 3 New Enterprise, PA 16664	____do ___	Adams, Bedford, Blair, Cumberland, Franklin, Huntingdon, Lancaster, Somerset.
Dimension:			
A. Dally & Sons Inc	Railroad Ave., Box 27 Pen Argyl, PA 18072	Quarries and mills.	Northampton.
Delaware Quarries	Route 32 Lumberville, PA 18933	Quarry ____	Bucks.
Pennsylvania Granite Corp	Box 510 St. Peters, PA 19470	____do ___	Chester.

[1]Also stone.

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